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MR. LUTHER ROBINSON'S

PLAN FOR VENTILATING

THE WINGS OF THE

UNITED STATES CAPITOL.

June, 1870.

No. 46 Congress Street,

Boston, June 10th, 1870.

To the Congressional Committee on Ventilation, Washington:—

Gentlemen, — The failure of most attempts to secure the satisfactory ventilation of buildings clearly proves that they have been made without regard to the true principles, on the right application of which, alone, success depends.

All simply "ejecting" plans, with or without the aid of heat, are wrong in theory; and are, therefore, as proved by universal experience, inefficient and unsatisfactory in practice; and all forcing plans are costly, for machinery, power, and care, even if excellent results *can* be secured, — and, as to results, I have seen many cases of failure, and none of marked success.

The philosophical reasons for their failure it is easy, but not necessary, now to state.

It is not my present purpose to write a general essay on Ventilation, nor to correct, describe, or discuss, unless briefly and incidentally, the various theories on this subject, nor even to recall to your minds the several interesting collateral questions often and properly discussed in this connection, presuming all these to be as familiar to the Committee as to myself.

My purpose is, rather, to propose a definite *practical* plan for securing, *beyond the possibility* of *failure*, a highly satisfactory condition of the atmosphere in the Legislative Halls in the Capitol in Washington.

After full and careful study of the philosophy, operation, and results of all systems in use in this country, and with an experience in ventilating many hundreds of buildings, small and large, with the most complete success, without an approach to a failure, — in the last six years, at least, — I can speak on this subject with the confidence of knowledge not merely theoretical.

I have fully considered the construction and circumstances of your Legislative Halls, and know precisely what is needful to make their atmosphere constantly fresh and comfortable, and shall offer to ventilate one or both of them, in accordance with the general plan herein indicated, executing all mechanical work in style and manner entirely satisfactory to the Committee, after examination; also, SECURING and WARRANTING *results* entirely satisfactory after a reasonable trial, on terms to be named in separate, more detailed specifications and proposal, soon to be made.

The proper ventilation of the Capitol, as of other buildings, requires the furnishing of an abundant supply of fresh air, its proper distribution, and the effectual removal of air from the building.

By the system of ventilation which I have orally explained to you, all of these objects are satisfactorily accomplished.

Beyond all doubt, fresh air is furnished, and impure air efficiently removed, and, with proper skill in the application of the system, without annoyance from currents.

To the roofs of buildings we apply structures of iron or other material,— *ventilators*, of peculiar construction, having mouths open in every direction, subdivided by several partitions, with tubes, straight or angular, long or short, as needful, subdivided to correspond with the divisions of the ventilators, extending through the upper portion of the building, and reaching proper points in the ceiling of the room to be ventilated. We thus establish communication through numerous passages, between the room and the external air.

Through these ventilators and connecting tubes, *alternating*

currents of air pass. Through some of them fresh air passes in, and is properly distributed, while through others impure air passes out, securing thus the real, efficient, quiet change of air, which constitutes good ventilation.

This is not theory, but fact, easily ascertained by intelligent examination of any one of the thousands of these ventilators already in use; and the results of the change are manifest to the most casual observer.

Over the Capitol, and within ten feet of its roof, an abundance of air passes, every day in the year, to ventilate, even excessively, more than a score of such buildings. It moves with a momentum varying with its velocity, but ever sufficient for our purpose.

We use this undoubted "power of the air" as one of two forces to accomplish our end. Whatever its velocity or direction, it presses against some face and into some mouth or mouths of these ventilators, and is conducted through some of the tubes to the room, as surely as water and illuminating gas, under pressure, are driven through their pipes to distant points for convenient use.

The necessary consequence of this influx of air is condensation, if the room is tight, or exit if not tight. But with the construction described there *can* be no condensation, as some faces under the lee must be less pressed than those against which the wind blows, allowing easy exit to the air driven out in consequence of the entrance of air on the opposite side.

This operation is visible to all who, on a frosty day, pass any of the three hundred drying and dressing rooms on which these ventilators are used.

From three rooms of this class, under control of members of the present Congress, moisture enough has already been removed, to form, when condensed, not less than forty thousand barrels of water.

The ordinary heat of a room, from whatever source derived, acts as another motive force, establishing and keeping up this same alternation of currents, even without the aid of wind.

Heat drives air through some of these passages, and not through all of them, while external air, even by its weight alone, falls in to supply its place.

This is demonstrable *fact*, which no argument can make more plain, nor any theorist disprove.

Thus, considering the impure air of a room simply as matter, subject solely to the laws of force, moving only as *moved*, we have at our command, and through these structures use, as forces, *wind and heat*, acting efficiently, separately or concurrently, effecting the desired change of air.

We thus provide for the efficient and quiet ventilation of any building, at all times, unless in the extremely rare but theoretically possible case of the failure of both forces.

But if, by respiration and radiation the temperature of the air is not increased, and if, at the same time, there is no appreciable movement of the external air, it is perfectly safe, and may add to comfort, to open all doors and windows.

Providing, as we do, for all cases in which it is desirable to close them because of the discomfort due to cold air or to currents; securing, as we do, at all such times, results closely bordering on perfection; we need not be too solicitous in regard to a possible conjuncture of conditions which may not exist during a single hour in a year, and for which provision can be made *only*, EVEN IF, by "mechanical power," already at your command.

Our ventilators standing on the roof, so low as not to be conspicuous from the ground, should be sufficiently large and numerous to correspond to the wants of the largest audience; only a portion of them being in use when the audience is small.

The tubes or boxes in the attic would need to be very large and complicated, extending over the entire galleries on all sides of the halls.

The ceiling over these galleries is very open, affording all or nearly all of the needed space.

In the ceiling of the Senate Chamber, no change would be

needed, and, in that of the House, only an enlargement of the openings at about 200 points, between the brackets, next to the walls on all sides of the hall, — a change not noticed unless on close inspection.

All of these *pores* in the ceiling would be used for the actual passage of the incoming and outgoing air.

They are admirably arranged for its proper distribution, in streams mild as the gentlest shower, the rising vapor, or the falling snow.

The halls might almost be said to breathe, taking in the good and expelling the bad air. If all breathe in unison, the halls as fast as the audience, as they may, nothing better can be required. Let the carbonic acid, observant of fundamental law, float into the outer air, as it will, all authorities and all theories "to the contrary notwithstanding," and we need have no fear that vegetation will fail to perform its work, and make the needful restoration.

From this "carbonic acid question," on which no darkness needs to rest, it would afford me pleasure, if time allowed, to brush the mists and myths with which false teaching has surrounded it.

Orally, I often discuss it in full, and shall be pleased *thus* to give to the Committee, if they desire, the facts and the law of the case.

Not merely these large halls, but their surroundings also can be vastly improved.

Over each stairway, besides the glass, is a very extensive porous ceiling.

All of this open space I would convert into immense respirators, our large, complex, and very angular boxes covering the whole, and connecting it with *giant* ventilators standing on the roof over the passages at the head of the stairs.

Through our ventilators and boxes thus arranged, injection *and* ejection will be effectually accomplished, securing throughout the stairways and connecting passages a state of freshness hitherto unknown, and not attainable, unless at enormous cost, by any other known plan.

All the rooms opening into these passages, especially those above the first story, will be improved in condition; and most or all of those occupied by few persons may be sufficiently ventilated by the frequent opening of doors, allowing direct communication with a reservoir of fresh and constantly changing air.

There can be no doubt as to the operation and results above indicated, as I have at least a score of successful similar cases.

The effect, I have no doubt, will be appreciable even below the level of the floor of the Legislative Halls, but in all the space above that level it cannot fail to be most marked.

These ventilators should be so large that if 3,000 persons should occupy the stairways and passages in each wing, with all doors and windows closed, there would be no suffering for want of pure air.

This arrangement alone would be of vast benefit to the occupants of the Legislative Halls, especially when the audience is large, as all doors from the halls would be likely to be then open.

Such, Gentlemen, is the general plan which I shall offer to apply to the wings of the Capitol.

Its universal success, wherever properly applied, is an index of what we may expect in the future.

In the House, a few weeks since, reference was made to the discomfort due to heat from the burning of gas above the ceiling.

A plan for securing almost complete protection from that annoyance can be easily applied.

Very respectfully,

LUTHER ROBINSON,

Agent of U. S. Ventilation Co.,
of Boston.